

FORM PTO-1530 (REV. 1-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				4100-0119P	
				U.S. APPLICATION NO. (If known, see 37 CFR 1.53) 09/744218 NEW	
INTERNATIONAL APPLICATION NO.		INTERNATIONAL FILING DATE		PRIORITY DATE CLAIMED	
PCT/EP99/08006		October 21, 1999		November 5, 1998	
TITLE OF INVENTION A PROCESS FOR THE METROLOGICAL ANALYSIS OF MULTICARRIER SIGNALS					
APPLICANT(S) FOR DO/EO/US WOLF, Peter; BALZ, Christoph					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1). 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19 th month from the earliest claimed priority date 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau. WO 00/28711 c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(3)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(2)). a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). Items 11. to 16. below concern document(s) or information included: 11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.-1449, German Search Report and International Search Report (PCT/ISA/210) w/ 5 documents 12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 14. <input type="checkbox"/> A substitute specification. 15. <input type="checkbox"/> A change of power of attorney and/or address letter. 16. <input checked="" type="checkbox"/> Other items or information: 1.) Two (2) sheets of Formal Drawings					

09/744218

PCT/EP99/08006

4100-0119P

JAN 22 2001 PCT/PTO 22 JAN 2001

- 17.
- ☒
- The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5):

Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO. \$1,000.00

International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO \$860.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(1)-(4). \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total Claims	5 - 20 =	0	X \$18.00
Independent Claims	1 - 3 =	0	X \$80.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable) None			+ \$270.00

TOTAL OF ABOVE CALCULATIONS =

Reduction of 1/2 for filing by small entity. Applicant claims small entity status (See 37
C.F.R. § 1.27)

SUBTOTAL =

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)).

TOTAL NATIONAL FEE =

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

TOTAL FEES ENCLOSED =

Amount to be:
refunded \$
charged \$

- a. ☒ A check in the amount of \$ 900.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account. No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 02-2448.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

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SIGNATURE

F. PRINCE BUTLER
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#25,666 (FPB)
REGISTRATION NO.

09/744218

PATENT

4100-0119P

1002 Rec'd PCT/PTO 22 JAN 2001

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant: WOLF, Peter et al.
Int'l. Appl. No.: PCT/EP99/08006
Appl. No.: New Group:
Filed: January 22, 2001 Examiner:
For: A PROCESS FOR THE METROLOGICAL
ANALYSIS OF MULTICARRIER SIGNALS

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, DC 20231

January 22, 2001

Sir:

The following Preliminary Amendments and Remarks are respectfully submitted in connection with the above-identified application.

AMENDMENTS

IN THE ABSTRACT:

Please add an abstract from the Abstract attached hereto.

IN THE SPECIFICATION:

Please amend the specification as follows:

Before line 1, insert --This application is the national phase under 35 U.S.C. § 371 of PCT International Application No. PCT/EP99/08006 which has an International filing date of October 21, 1999, which designated the United States of America.--

IN THE CLAIMS:

Please amend the claims as follows:

Claim 3: Line 1, delete "or 2"

Claim 4: Lines 1 to 2, change "one of the preceding claims" to --claim 1--

REMARKS

The specification has been amended to provide a cross-reference to the previously filed International Application. The claims have also been amended to delete multiple dependents and to place the application into better form for examination. An Abstract has been added due to its ommittance during the translation of the International Application. Entry of the present amendment and favorable action on the above-identified application are respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By 
F. Prince Butler, #25,666

FPB/cqc
4100-0119P
Attachment

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ABSTRACT

For measuring and evaluating multi-carrier signals the I and/or Q components obtained by demodulation are integrated across several values and are graphically shown for every single carrier or combined carrier groups of the multi-carrier signal on the screen display unit. To this end, the individual carriers or carrier groups are applied side by side on the horizontal axis of a diagram and the I and/or Q components that pertain to said carriers or carrier groups are recorded along a vertical line.

2/PRB

J002 Rec'd PCT/PTO

09/744218

English Translation 22 JAN 2001
Application

A Process for the Metrological Analysis
of Multicarrier Signals

The invention relates to a process according to the preamble of the Main Claim.

In OFDM (Orthogonal Frequency Division Multiplex)
5 multicarrier systems used in modern transmission technology, for example in DAB (Digital Audio Broadcasting) and DVB-T (Digital Video Broadcasting, terrestrial), for a metrological analysis a graphic display enabling a user to detect system faults at a glance is desirable. Although it
10 is known to graphically display the digital modulation of a single carrier on the screen of a display device with combined shift keying between amplitude- and/or phase states in the vector diagram (I/Q plane) (German OS 195 47 896), this facility provided for a single carrier is not
15 effective for a multicarrier system comprising for example 1536 individual carriers in the case of DAB, or 1705 or 6817 individual carriers in the case of DVB as a selective assessment of the signal can be performed only in a very complicated manner in such cases.

20 Therefore the object of the invention is to indicate a simple process with which the I/Q components of a OFDM signal can be graphically displayed, separately for each individual carrier, for the metrological analysis.

25 Commencing from a process according to the preamble of the Main Claim, this object is achieved by the characterising features of the Main Claim. Advantageous further developments are described in the sub-claims.

30 In accordance with the invention, the I-components and/or Q-components of a freely selectable number of symbols are acquired either individually or jointly and are then graphically displayed in a vertical line on the screen of a
35 display device for each individual carrier of the multicarrier system. In this way, even in a multicarrier

system of this type an observer can immediately establish whether any symbols at all are being transmitted on one or more carriers. Thus in the absence of I/Q values a gap appears in the column in place of the relevant carrier. If
 5 disturbed symbols or no symbols at all but only noise is transmitted in the case of one or more carriers, this is visible in the form of a vertical, continuous line in the rows. The user thus obtains a simple graphic overview of the utilization of the value range of the I- and Q-
 10 components as a function of the frequency and in this way can metrologically analyze such an OFDM multicarrier system in a simple manner.

In the following the invention will be explained in detail
 15 in the form of an exemplary embodiment for a multicarrier signal in the 8k mode with 16-QAM modulation making reference to a schematic drawing.

Figure 1 illustrates the constellation diagram for a 16-QAM modulation. In a processor all these individual modulation points of the two-dimensional diagram are projected onto the ordinate y, as illustrated in Figure 2. This is performed for each individual carrier of the multicarrier system whereupon, in accordance with Figure 3, the relevant
 20 I- and Q-components projected onto a vertical line are displayed on the screen individually for each carrier. Points lying one above another and representing the I/Q value for each carrier thus appear horizontally in rows on the screen. If no symbol is transmitted on a carrier, this
 25 is represented for the relevant carrier by an absence of measurement points in the form of gaps, as illustrated in Figure 3 for the carrier x. If one of the modulation points is disturbed due to a fault, as represented by the value spot W in Figure 1, this manifests in the form of a
 30 vertical line S crossing the decision field for the relevant carrier. If only noise is transmitted via one of the carriers, this is represented by a continuous vertical

line in the diagram in Figure 3. The user thus has the possibility of metrologically analyzing the mode of operation of an OFDM multicarrier system.

- 5 The abscissa of the diagram in Figure 3 is scaled with the numbers k of the individual carriers of the multicarrier system, thus from 0 to 6816 (8k-mode) in the case of DVB-T with a total of 6817 carriers. In many cases such a large number of carriers cannot be displayed with adequate
- 10 resolution on the screen of a display device. A screen commonly used in practice only permits a display over 320 columns for example in the horizontal direction. In these cases it is expedient for the entire carrier spectrum to be split into individual sections and for only the individual
- 15 sections in each case to be displayed on the screen, or for the data of a plurality of carriers to be combined to form a group and for the data of this group to be displayed in a column on the screen.
- 20 If, in accordance with the exemplary embodiment, all the I- and Q- components are in each case projected onto a common line y, it is undetectable whether a determined disturbance originates from the I- or Q- value or from a combination of these two values. Therefore it is advantageous to provide
- 25 a switch-over device with which optionally either only all the integrated I-components or only all the integrated Q-components or a combination of all the I-Q components can be displayed for each carrier. Another option consists of
- 30 in each case separately projecting the I- and Q-components onto closely adjacent vertical lines, these then also being shown separately for each carrier in the diagram according to Figure 3. This is both effective and possible for multicarrier systems comprising for example only 100
- 35 carriers. The I-components are thus projected for example onto the line Y' shown as a broken line in Figure 2, while the Q-components are projected onto the directly adjacent vertical line Y.

Figure 4 schematically illustrates an exemplary embodiment for the integration and line projection of the I- and Q-values of the individual carriers for a single symbol within an OFDM signal. For this purpose a two-dimensional array (matrix memory) is used, one dimension of which corresponds to the individual carriers $0 \dots K_{\max}$ of the OFDM-signal or carrier groups g formed by the combining of adjacent individual carriers k_1 to k_2 in order to save memory space. The number of memory cells for this dimension of the matrix memory is determined by the number of columns of the display being used, for example 320.

The other dimension of the matrix memory is reserved for the I- and Q-values. Here a separate memory cell is provided for each possible state of I and Q within the state diagram of the type of modulation being used, thus in the case of an 8-bit-coding of the I- and Q-values $2^8 = 256$ memory cells are provided for this dimension of the matrix memory. The relevant I- and Q-values are formed by complex demodulation of the individual carriers; they always relate to a single carrier k and to a single symbol within the OFDM signal, a symbol being determined by the totality of all the carriers at the time t .

The demodulated IQ-values are entered into this matrix memory consisting for example of 256 row addresses and 320 column addresses.

At the start the matrix memory is initialised once with zeros.

Within a current symbol the following steps are performed:

Step 1:

For the first carrier k_0 the associated I- and Q-values I_0 and Q_0 are determined and a predetermined hold value, for

5

Step 2:

10

Step 3:

15

Step 4:

25

35

cycles. If, in the illustrated example, the hold value 10 is selected, when process step 4 has been executed ten times the content of the memory cell becomes zero, thereby indicating that this I/Q-value has not occurred in the past
5 ten refresh cycles.

In the event that individual carriers are combined to form a carrier group, the above described process steps are repeated for all the carriers of a group until all the
10 carriers of a group are analyzed. Then the memory is addressed for the next carrier group.

Claims

1. A process for the metrological analysis of multicarrier signals, characterised in that the I- and/or Q-components acquired by demodulation are integrated over a plurality of values and are graphically displayed on the screen of a display device for each individual carrier or combined carrier group of the multicarrier signal in that the individual carriers or carrier groups are plotted one beside another on the horizontal axis of a diagram and the I- and/or Q-components associated with these carriers or carrier groups are in each case plotted along a vertical line.

2. A process according to Claim 1, characterised in that the I- and Q-components associated with each individual carrier or carrier group are projected onto a single vertical line so that the I- and Q-components for all the carriers occur in a horizontal line of the diagram and faulty I- or Q-values appear as vertical lines or entirely absent I/Q-values appear as gaps in the horizontal lines.

3. A process according to Claim 1 or 2, characterised in that in each case only a portion of the total frequency band occupied by the multicarrier system is displayed on the screen.

4. A process according to one of the preceding claims, characterised in that the integration and line projection of the I- and Q-values of the individual symbols, acquired by complex demodulation of the individual carriers, take place in a matrix memory which in one of its dimensions has as many row addresses as I- and Q-values are provided for the coding used, and in its other dimension has as many column addresses as individual carriers or carrier groups combined from adjacent carriers are

provided, wherein consecutively for each carrier or each carrier group, a hold value is in each case entered in the row addresses, corresponding to the respective I- and Q-values, of the associated column addresses, and following
5 the analysis of a predetermined number of symbols, the content of the matrix memory is read out for each column address for the graphic display on the display device.

5. A process according to Claim 4, characterised in
10 that following the reading out of the matrix memory, the content of all the addresses of the matrix memory is decremented by 1.

1/2

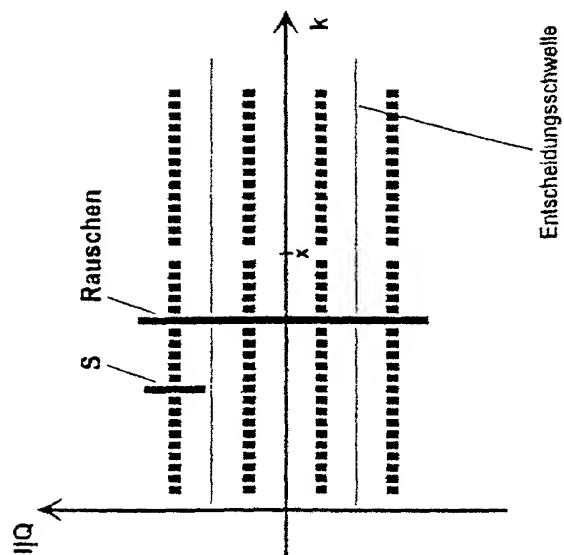


Fig. 3

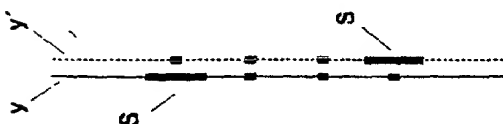
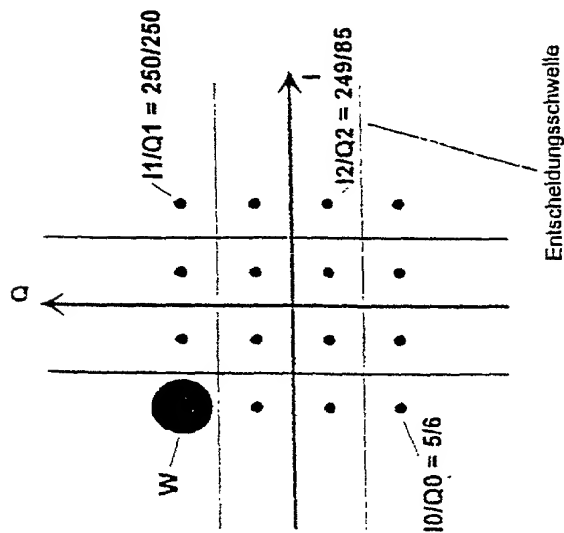


Fig. 2



16 QAM

Fig. 1

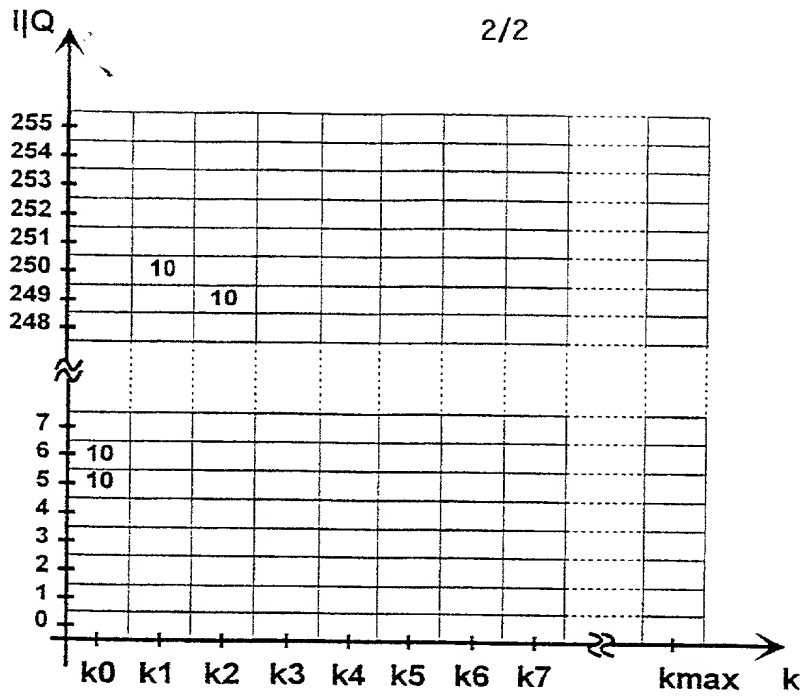


Fig. 4

Atty.Dkt.No.: 4100-0119P

**Declaration and Power of Attorney For Patent Application
(or PCT) Erklärung Für Patentanmeldungen Mit Vollmacht**

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

daß mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

daß ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

(1) A PROCESS FOR THE METROLOGICAL

ANALYSIS OF MULTICARRIER SIGNALS

deren Beschreibung hier beigefügt ist außer das folgende Feld ist angekreuzt:
(zutreffendes ankreuzen)

☐ (2) vorhergehend eingereicht

☒ (3) am 21. Oktober 1999 unter der

☐ (4) U.S. Anmeldungsseriennummer _____

der PCT International No. PCT/EP99/08006

und ☐ (5) wurde am _____
abgeändert (falls tatsächlich abgeändert).

Ich bestätige hiermit, daß ich Inhalt der obigen Patentanmeldung einschließlich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56 von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäß Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfinderurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

(1) _____

the specification of which is attached hereto unless the following box is checked:
(check appropriate blocks)

☐ (2) was filed _____

☐ (3) on _____ as

☐ (4) U.S. Appln. S. N. _____

or PCT International No. _____

☐ (5) as amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Atty.Dkt.No.: 4100-0119P

German Language Declaration

Prior foreign applications / Priorität beansprucht

(6) 198 51 093.4	GERMANY	05/November/1998	[X]	[]
(Number)	(Country)	(Day/Month/year Filed)	Yes	No
(Nummer)	(Land)	(Tag/Monat/Jahr eingereicht)	Ja	Nein
(6)			[]	[]
(Number)	(Country)	(Day/Month/year Filed)	Yes	No
(Nummer)	(Land)	(Tag/Monat/Jahr eingereicht)	Ja	Nein
(6)			[]	[]
(Number)	(Country)	(Day/Month/year Filed)	Yes	No
(Nummer)	(Land)	(Tag/Monat/Jahr eingereicht)	Ja	Nein

Ich beanspruche hiermit gemäß Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119(e), den Vorzug aller unten aufgeführten vorläufigen Anmeldungen.

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below.

(7)	
(Application Serial No.)	(Filing Date)
(Anmeldeseriennummer)	(Anmeldedatum)

(7)	
(Application Serial No.)	(Filing Date)
(Anmeldeseriennummer)	(Anmeldedatum)

Ich beanspruche hiermit gemäß Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 112 offenbart ist, erkenne ich gemäß Absatz 37, Bundesgesetzbuch, Paragraph 1.56 meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(8)			
(Application Serial No.)	(Filing Date)	(Status)	(Status)
(Anmeldeseriennummer)	(Anmeldedatum)	(patentiert, anhängig, aufgegeben)	(patented, pending, abandoned)

(8)			
(Application Serial No.)	(Filing Date)	(Status)	(Status)
(Anmeldeseriennummer)	(Anmeldedatum)	(patentiert, anhängig, aufgegeben)	(patented, pending, abandoned)

Ich erkläre hiermit, daß alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und daß ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, daß wissentlich und vorsätzlich falsche Angaben gemäß Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und daß derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patents gefährden werden.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Atty.Dkt.No.: 4100-0119P

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den Patentanwalt (oder die Patentanwälte) und/oder Patent Agenten, **Kundennummer 2292**, mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichen: (Aktuellen Namen und aktuelle Registrationsnummer anführen,)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the attorney(s) and/or agent(s) of **Customer No. 2292** to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list current names and registration numbers).

Raymond C. Stewart, Reg. No. 21,066
 Joseph A. Kolasch, Reg. No. 22,463
 Bernard L. Sweeney, Reg. No. 24,448
 Charles Gorenstein, Reg. No. 29,271
 Leonard R. Svensson, Reg. No. 30,330
 Andrew D. Meikle, Reg. No. 32,868
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 James M. Slattery, Reg. No. 28,380
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 Donald J. Daley, Reg. No. 34,313
 John A. Castellano, Reg. No. 35,094
 F. Prince Butler, Reg. No. 25,666
 Fred S. Whisenhunt, Reg. No. 24,378
 Richard Gallagher, Reg. No. 28,781

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Direct Telephone Calls to:
 (name and telephone number)

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F. Prince Butler
 Send Correspondence to address of
Customer No. 2292, currently:

Birch, Stewart, Kolasch & Birch, LLP
P.O. Box 747
Falls Church, Virginia 22040-0747

Voller Name des ersten Erfinders:

Full name of first inventor:

(9) Peter WOLF

Unterschrift des ersten Erfinders

Datum

Signature of first inventor

Date

Wohnsitz

Residence

Kolumbusstr. 4, D-81543 Muenchen, GERMANY
 Staatsangehörigkeit

Citizenship

German

Postanschrift

Post Office Address

Same as above

Post Office Address